

REMARKS

Claims 12, 13, 15 and 17-22 are pending in this application. By this Amendment, claims 12, 15 and 18 are amended and claims 14 and 16 are canceled. Support for the amendments to the claims may be found, for example, in the original claims and in the specification at pages 5 and 6. No new matter is added.

In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

I. Rejection Under 35 U.S.C. §112, Second Paragraph

The Office Action rejects claims 14, 16¹ and 18-22 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. By this Amendment, claims 14 and 16 are canceled, rendering their rejection moot and claims 15 and 18 are amended in light of the Examiner's comments. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. Rejection Under 35 U.S.C. §102

The Office Action rejects claims 12, 15, 17, 18 and 22 under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 5,331,344 to Miyagawa et al. ("Miyagawa"). Applicants respectfully traverse the rejection.

It is well settled that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. See MPEP §2131.

¹ The Office Action asserts that claim 16 recites the limitation "epoxy type" in line two. Claim 16 does not recite "epoxy type"; however, claim 15 recites the limitation "epoxy type" in line two. Applicants assume the Office Action intended to refer to claim 15 and address the rejection based on this assumption.

Without conceding the propriety of the rejection, claim 12 is amended to incorporate the subject matter of non-rejected canceled claims 14 and 16. Accordingly, Claim 12 is not anticipated by Miyagawa. Claims 15, 17, 18 and 22 variously depend from claim 12 and, thus, also are not anticipated by Miyagawa. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

III. Rejection Under 35 U.S.C. §103

The Office Action rejects claims 13, 14, 16 and 19-21 under 35 U.S.C. §103(a) over Miyagawa. By this Amendment, claims 14 and 16 are canceled, rendering their rejection moot. Applicants respectfully traverse the rejection.

The Office Action asserts that Miyagawa teaches photosensitive layers that can be formed by solution coating with a suitable solvent. The Office Action acknowledges that Miyagawa does not specifically teach the thickness ranges as instantly claimed. However, the Office Action further asserts that it would have been obvious to one of ordinary skill in the art to use the thickness values within the same order of magnitude as taught by Miyagawa, utilizing routine experimentation to determine the desired thickness of each layer for a particular end use. Applicants respectfully disagree.

Claim 12 recites (emphasis added):

Microstructure comprising an adhesive layer between a substrate and a photo-patternable layer, the adhesive layer being photosensitive, arranged on at least one face of the substrate and being formed by a negative resin comprising at least one polymer of the elastomer family and at least one photo-initiating component, in solution in an aromatic solvent;

wherein the adhesive layer has a thickness in the range of 200nm to 10μm, and

the photo-patternable layer has a thickness in the range of 50μm to 200μm.

Miyagawa fails to teach or suggest such a combination of features.

Specifically, Miyagawa fails to teach or suggest an adhesive layer formed by a negative resist arranged on at least one face of a substrate that has a "thickness in the range of 200nm to 10 μ m," and a photo-patternable layer that has a "thickness in the range of 50 μ m to 200 μ m." Rather, as evidenced by Examples 1-14, Miyagawa teaches positive resist layers with a similar thickness in the range of 20-35 μ m should be utilized. Furthermore, as discussed below, Miyagawa teaches away from negative resists and does not provide any reason or rationale for one of ordinary skill in the art to fashion a microstructure with a photo-patternable layer, and an adhesive layer formed of a negative resist arranged on at least one face of a substrate, with the dimensions as recited in claim 12.

For example, Miyagawa discloses that sufficient adhesion strength is not obtained when a negative photosensitive material layer is formed on a substrate. See Miyagawa, col. 23, lines 32-47, reproduced below for convenience (emphasis added).

When a negative photosensitive material layer is formed on a substrate, sufficient adhesion strength is often not obtained, and the causes of such insufficient adhesion have been estimated by the investigation of the present inventors as follows. The negative photosensitive material generally shows a film thickness loss of about 5 to 20%, namely the dissolution of uncrosslinked molecules in the development step after the exposure.

Furthermore, Miyagawa teaches that satisfactory adhesion is obtained with positive resists and explains why the adhesion deteriorates with negative resists. See Miyagawa, col. 16, line 26 to col. 17, line 37, reproduced in-part below for convenience (emphasis added),

...the use of crosslinkable positive resist as the constituent material of the recording head provides following advantages:

...(3) Satisfactory adhesion is obtained between the first and second photosensitive material layers. This is presumably because the adhesion can be improved for example by pressure as the second photosensitive material layer can be laminated on the first photosensitive material layer while it is not developed yet, also because of little film thickness loss in said layers, and because a crosslinking reaction takes place between the first and second layers.

In the following there will be explained the deterioration of

adhesion resulting from the film thickness loss.

...In general, negative resists show a smaller film thickness after the development than the film thickness after coating, so that the preparation of recording head without such film thickness loss is relatively difficult. Such negative resists form a pattern by intermolecular crosslinking, but the sensitivity inducing gelation by crosslinking varies significantly by the molecular weight of the resist. Polymer material such as resist inevitably involves a distribution in the molecular weight, and the molecules of lower molecular weights with lower sensitivity are dissolved at the development, thus causing film thickness loss. Naturally the film thickness loss can be reduced by a significant increase in the exposure dose, but an excessive exposure seriously deteriorates the resolving power of the resist...

In contrast, the present embodiment is capable of securely preventing the deteriorated adhesion resulting from the film thickness loss, by the use of the crosslinkable positive resist...

...Also in the preparation of a recording head, there may be required a long developing time because the developer is supplied through small ink discharge openings or a small ink supply opening, but the crosslinkable positive resists are free from the drawbacks of variation in the head dimensions resulting from the change in developing time, because they are almost free from film thickness loss as explained before....

Finally, benefits described in the instant specification at page 5, lines 16-19, are not taught or suggested by Miyagawa. These benefits include, for example, how the small thickness of the adhesive layer with respect to the thickness of the photo-patternable layer enables the influence of the geometry of the microstructure and of the nature of the substrate to be eliminated.

Thus, Applicants respectfully submit that there is no reason or rationale found in Miyagawa establishing why one of ordinary skill in the art at the time of the invention would have modified the teachings of Miyagawa and to arrive at the combination of features recited in claim 12. Therefore, for at least the reasons discussed above, Miyagawa fails to teach or suggest each and every feature of independent claim 12 and, thus, would not have rendered obvious independent claim 12.

Independent claim 12 would not have been rendered obvious by Miyagawa.

Claims 13 and 19-21 variously depend from claim 12 and, thus, also would not have been rendered obvious by Miyagawa. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachment:

Petition for Extension of Time

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